AMENDMENTS TO THE CLAIMS

1. (Currently amended) A method for analyzing a nucleic acid polymer comprising

providing a conjugate comprising a nucleic acid tag molecule and a nucleic acid binding enzyme,

contacting a nucleic acid polymer with [[a]] the conjugate ~~comprising a nucleic acid tag molecule and a nucleic acid binding enzyme~~,

allowing the nucleic acid binding enzyme to bind to the nucleic acid polymer non-specifically, and

allowing the nucleic acid tag molecule to bind specifically to the nucleic acid polymer, and

determining a pattern of binding of the conjugate to the nucleic acid polymer,

wherein the nucleic acid binding enzyme binds to the nucleic acid polymer without cleavage, and is not detected based on its catalytic activity;

wherein the nucleic acid tag molecule and the nucleic acid binding enzyme are covalently linked to each other.

2. (Previously presented) The method of claim 1, further comprising allowing the nucleic acid binding enzyme to translocate along the nucleic acid polymer.

3-4. (Cancelled)

5. (Previously presented) The method of claim 1, wherein the nucleic acid polymer is DNA or RNA.

6. (Original) The method of claim 1, wherein the nucleic acid tag molecule is selected from the group consisting of a peptide nucleic acid (PNA), a locked nucleic acid (LNA), a DNA, an RNA, a bisPNA clamp, a pseudocomplementary PNA, and a LNA-DNA co-polymer.

7. (Original) The method of claim 1, wherein the nucleic acid tag molecule is 5-50 residues in length.

8. (Cancelled)

9. (Previously Presented) The method of claim 1, wherein the nucleic acid tag molecule and the nucleic acid binding enzyme are conjugated using a linker molecule.

10. (Cancelled)

11. (Previously Presented) The method of claim 1, wherein the enzyme is selected from the group consisting of a DNA polymerase, an RNA polymerase, a DNA repair enzyme, a helicase, a nuclease, and a ligase.

12. (Previously presented) The method of claim 1, wherein the enzyme lacks the ability to modify the nucleic acid tag molecule or the nucleic acid polymer.

13. (Original) The method of claim 1, wherein the nucleic acid tag molecule is labeled with a detectable moiety.

14. (Previously Presented) The method of claim 1, wherein the nucleic acid binding enzyme is labeled with a detectable moiety.

15. (Previously Presented) The method of claim 1, wherein the nucleic acid tag molecule is labeled with a first detectable moiety, and the nucleic acid binding enzyme is labeled with a second detectable moiety.

16. (Previously presented) The method of claim 1, wherein the nucleic acid polymer is labeled with a detectable moiety.

17. (Original) The method of claim 16, wherein the detectable moiety is a backbone specific label.

18. (Cancelled)

19. (Previously presented) The method of claim 1, wherein the pattern of binding of the conjugate to the nucleic acid polymer is determined using a linear polymer analysis system.

20. (Previously presented) The method of claim 19, wherein the linear polymer analysis system comprises exposing the nucleic acid polymer to a station to produce a signal arising from the binding of the conjugate to the polymer, and detecting the signal using a detection system.

21. (Previously presented) The method of claim 1, wherein the pattern of binding of the conjugate to the nucleic acid polymer is determined using fluorescence in situ hybridization (FISH).

22. (Previously Presented) The method of claim 13, wherein the detectable moiety is a fluorescent molecule.

23. (Previously Presented) The method of claim 22, wherein the detectable moiety is detected using a fluorescent detection system.

24. (Previously presented) The method of claim 1, wherein the nucleic acid polymer is a non in vitro amplified nucleic acid molecule.

25. (Original) The method of claim 1, wherein the nucleic acid tag molecule is not an antisense molecule.

26. (Original) The method of claim 1, wherein the nucleic acid tag molecule does not hybridize to bacterial or viral specific sequences.

27. (Original) The method of claim 1, wherein the nucleic acid tag molecule is labeled with an agent.

28. (Original) The method of claim 27, wherein the agent is capable of cleaving a nucleic acid molecule.

29. (Original) The method of claim 28, wherein the agent is a photocleaving agent.

30. (Original) The method of claim 27, wherein the agent is able to modify a nucleic acid molecule.

31. (Previously Presented) The method of claim 1, wherein the nucleic acid binding enzyme is detected indirectly.

32. (Previously Presented) The method of claim 31, wherein the nucleic acid binding enzyme is detected indirectly using an antibody or an antibody fragment specific for the nucleic acid binding enzyme.

33. (Previously Presented) The method of claim 19, wherein the linear polymer analysis system is a single polymer analysis system.

34. (Previously presented) The method of claim 1, wherein the pattern of binding of the conjugate to the nucleic acid polymer is determined using a method selected from the group consisting of optical mapping, and DNA combing.

35-67. (Cancelled)

68. (Previously presented) A method for analyzing a nucleic acid polymer comprising:

generating optical radiation of a known wavelength to produce a localized radiation spot;

passing a nucleic acid polymer through a microchannel;

irradiating the nucleic acid polymer at the localized radiation spot;

sequentially detecting radiation resulting from interaction of the nucleic acid polymer with the optical radiation at the localized radiation spot; and

analyzing the nucleic acid polymer based on the detected radiation,

wherein the nucleic acid polymer is bound to a conjugate of a nucleic acid tag molecule and a nucleic acid binding enzyme,

wherein the nucleic acid binding enzyme binds to the nucleic acid polymer without cleavage, and is not detected based on its catalytic activity,

wherein the nucleic acid tag molecule and the nucleic acid binding enzyme are covalently linked to each other.

69-90. (Cancelled)

91. (Currently amended) A method for analyzing a nucleic acid molecule, comprising:

providing a conjugate comprising a nucleic acid tag molecule and a nucleic acid binding enzyme,

exposing a nucleic acid molecule to [[a]] the conjugate ~~of a nucleic acid tag molecule and a nucleic acid binding enzyme~~,

allowing the nucleic acid binding enzyme to bind to the nucleic acid molecule non-specifically, and

allowing the nucleic acid tag molecule to bind to the nucleic acid molecule in a sequence-specific manner, and

determining a pattern of binding of the conjugate to the nucleic acid molecule,

wherein the nucleic acid binding enzyme binds to the nucleic acid molecule without cleavage, and is not detected based on its catalytic activity, and

wherein the nucleic acid tag molecule and the nucleic acid binding enzyme are covalently linked to each other.

92-124. (Cancelled)

125. (Currently amended) A method for analyzing a nucleic acid polymer comprising

contacting a nucleic acid polymer with a conjugate comprising a nucleic acid tag molecule and a nucleic acid binding agent,

allowing the nucleic acid binding agent to bind to the nucleic acid polymer non-specifically, and

allowing the nucleic acid tag molecule to bind specifically to the nucleic acid polymer,

wherein the nucleic acid binding agent is selected from the group consisting of a DNA repair enzyme, a helicase, and a ligase; and

wherein the nucleic acid tag molecule and the nucleic acid binding ~~enzyme~~ agent are covalently linked to each other.

126. (Currently amended) A method for labeling a nucleic acid polymer comprising

providing a conjugate comprising a nucleic acid tag molecule and a nucleic acid binding enzyme,

contacting a nucleic acid polymer with [[a]] the conjugate ~~comprising a nucleic acid tag molecule and a nucleic acid binding enzyme~~,

allowing the nucleic acid binding enzyme to bind to and translocate along the nucleic acid polymer, and

allowing the nucleic acid tag molecule to bind specifically to the nucleic acid polymer thereby labeling the polymer,

wherein the nucleic acid binding enzyme binds to the nucleic acid polymer non-specifically,

wherein the nucleic acid binding enzyme binds to the nucleic acid polymer without cleavage, and is not detected based on its catalytic activity; and

wherein the nucleic acid tag molecule and the nucleic acid binding enzyme are covalently linked to each other.

127. (Cancelled)

128. (Previously presented) The method of claim 126, further comprising determining a pattern of binding of the conjugate to the nucleic acid polymer.

129. (Currently amended) A method for analyzing a nucleic acid polymer comprising

providing a conjugate comprising a nucleic acid tag molecule and a nucleic acid binding enzyme,

contacting a nucleic acid polymer with [[a]] the conjugate ~~comprising a nucleic acid tag molecule and a nucleic acid binding enzyme~~,

allowing the nucleic acid binding enzyme to bind to the nucleic acid polymer non-specifically, and

allowing the nucleic acid tag molecule to bind specifically to the nucleic acid polymer,

wherein the nucleic acid binding enzyme is a nuclease that binds to the nucleic acid polymer without cleavage, and is not detected based on its catalytic activity; and

wherein the nucleic acid tag molecule and the nucleic acid binding enzyme are covalently linked to each other.

130. (Previously presented) A method for analyzing a nucleic acid polymer comprising

contacting a nucleic acid polymer with a conjugate comprising a nucleic acid tag molecule and a nucleic acid binding enzyme,

allowing the nucleic acid binding enzyme to bind to the nucleic acid polymer non-specifically, and

allowing the nucleic acid tag molecule to bind specifically to the nucleic acid polymer, and

determining a pattern of binding of the conjugate to the nucleic acid polymer based on detection of the nucleic acid tag molecule and not the nucleic acid binding enzyme,

wherein the nucleic acid binding enzyme binds to the nucleic acid polymer without cleavage; and

wherein the nucleic acid tag molecule and the nucleic acid binding enzyme are covalently linked to each other.